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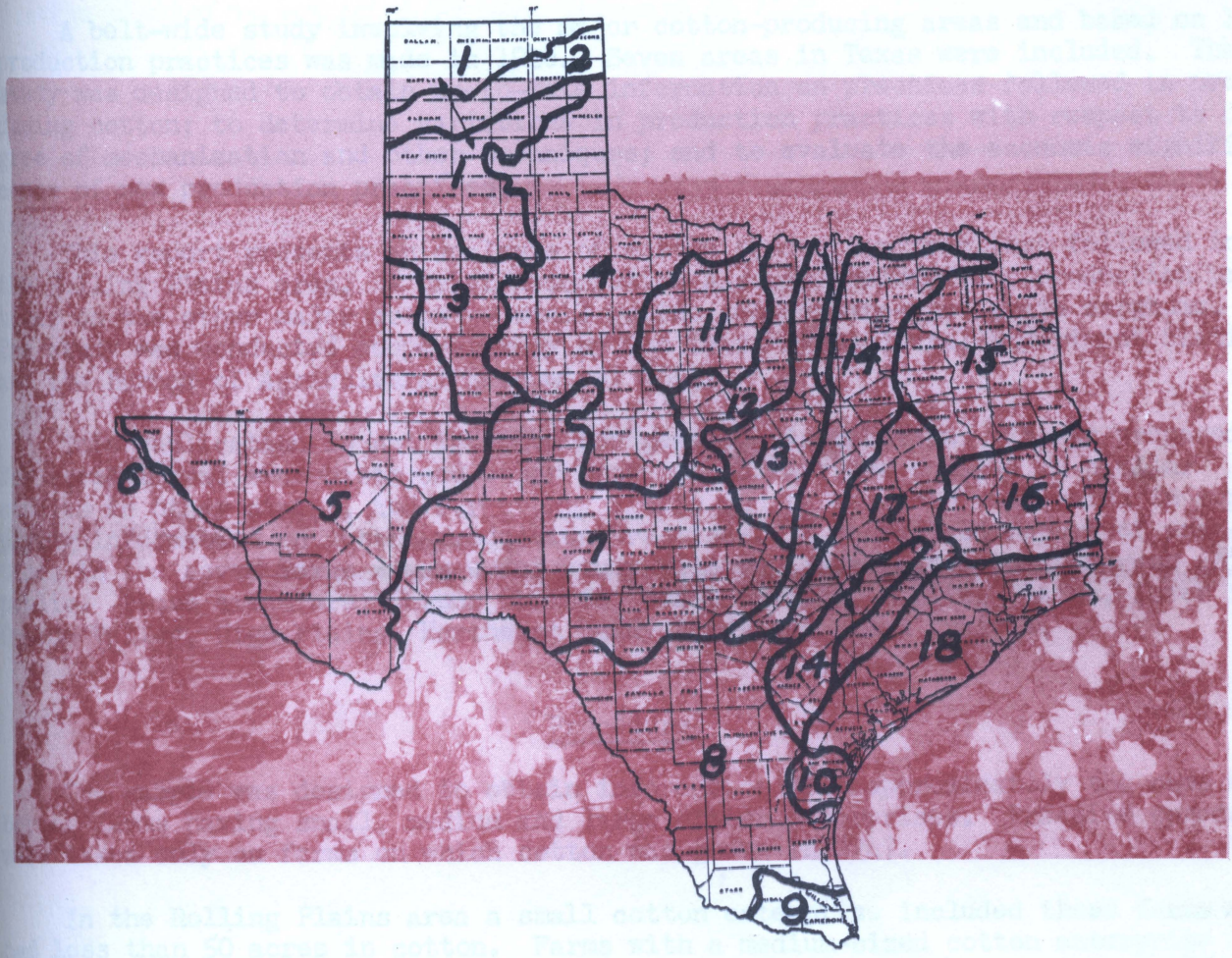

Texas Agricultural Experiment Station
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COTTON PRODUCTION PRACTICES IN THE ROLLING PLAINS AREA, 1947

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A belt-wide study involving the major cotton-producing areas and based on 1947 production practices was made in 1948. Seven areas in Texas were included. The study was designed to obtain up-to-date information on practices followed in producing cotton; to determine variations in production practices with respect to degree of mechanization and other techniques; and to evaluate the economic significance of new production practices.

This report presents an analysis of cotton production practices followed in the Rolling Plains area. A brief description also is included for production practices on the other major crops -- small grains and combine-type grain sorghums. The study was conducted cooperatively by the Texas Agricultural Experiment Station and the Bureau of Agricultural Economics, USDA.

This publication is not intended for general distribution. It was prepared for agricultural economists and other professional workers engaged in similar studies in other states, and for county agents and farmers who cooperated in supplying information on cotton-production practices. A summarized report of practices in the seven Texas areas under study will be issued later to the press and public. These areas are: Corpus Christi, Coast Prairie, Rolling Plains, Lower Rio Grande Valley, High Plains, Northeast Sandy Lands and Black Prairie.

Procedure

The sample was designed to obtain information from approximately the same number of farms having small, medium and large cotton enterprises. Practice schedules were taken only on farms on which cotton was grown in 1947.

In the Rolling Plains area a small cotton enterprise included those farms which had less than 50 acres in cotton. Farms with a medium-sized cotton enterprise had from 50 to 99 acres in cotton. Large cotton enterprises consisted of farms having 100 acres or more in cotton. Subsequent references made to a particular size group in the remainder of the report refer to the above-mentioned classification.

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The information upon which this report is based was obtained through personal interviews with cooperating farmers. Data were obtained for 203 farms, which included 47 small farms, 72 medium-sized farms and 84 large farms.

Trends in Acreage, Yield and Production of Cotton, 1928-48

Acreage devoted to cotton in the Rolling Plains area has declined sharply since 1933 when the cotton adjustment programs were initiated, Table 1. The decline was given further impetus during the latter part of the war and the immediate postwar years because of relatively high prices for grain and low power and labor requirements for grain crops. Following the slump in grain prices in 1948, the acreage planted to cotton shows some increase in 1949.

Table 1. Estimated acreage, yield and production of cotton, Rolling Plains Area, 1928-48

Year	Acres 1/	Production	Yield	Year	Acres 1/	Production	Yield
	Thousand	Thousand bales 2/	Pounds		Thousand	Thousand bales 2/	Pounds
1928	3,212.6	795.8	118	1938	1,674.6	495.3	141
1929	3,381.1	631.7	89	1939	1,687.0	365.0	103
1930	3,182.3	420.8	63	1940	1,608.1	533.6	159
1931	2,777.3	819.2	141	1941	1,597.3	756.5	226
1932	2,716.6	1,166.2	205	1942	1,667.0	697.3	200
1933	3,135.4	969.4	148	1943	1,666.7	416.1	119
1934	2,020.8	240.7	57	1944	1,447.8	554.5	183
1935	2,080.0	624.1	143	1945	1,335.9	381.8	137
1936	2,283.8	387.4	81	1946	1,339.1	271.6	97
1937	2,337.6	858.7	176	1947	1,622.7	494.4	145
				1948	1,641.2	497.2	145

1/ Acreage in cultivation, July 1.

2/ 500-lb. gross-weight bales.

Source: USDA Agricultural Statistics, and Crops and Markets.

Size of Farm

Distribution of farms, acreage of cotton and production by size of cotton enterprise in 1944 are listed in Table 2. Although large farms made up only 20 percent of the total number of cotton farms, they accounted for 46 percent of the total acreage and production.

Table 2. Distribution of farms, cotton acreage and production by size of cotton enterprise, 1944

Size group (acres in cotton)	Number of farms: Number	Number of farms: Percent of total	Cotton acreage: Thousand acres	Cotton acreage: Percent of total	Cotton production: Thousand bales	Cotton production: Percent of total	Percent of farms having tractors
Small, under 50	8,894	44.4	249.4	18.4	93.6	17.6	72.9
Medium, 50-99	7,093	35.4	481.1	35.6	190.9	36.0	91.5
Large, 100 & over	4,042	20.2	623.1	46.0	246.6	46.4	96.8
Total	20,029	100.0	1,353.6	100.0	531.1	100.0	94.5

Source: Special Cotton Report, U. S. Census, 1945, and TAES Circular 117.

Land, Livestock and Labor Organizations

The 1947 land, livestock and labor organizations are shown in Table 3.

Small Cotton Farms. The small cotton farms averaged 215 acres with 139 acres of cropland. The usual range in cropland was from 110 to 230 acres; however, a few farms were considerably above the range and a few much below it. On small farms an average of 23 percent of the cropland was in cotton, 29 percent in grain sorghum, 40 percent in small grain and 8 percent in miscellaneous crops such as corn, Sudan and other feed crops. Pasture land, homestead, and the like, included all land not in cropland, the major portion of which was in pasture. Milk cows, other cattle, hogs and chickens were the principal livestock found on the small farms. Only 15 percent reported workstock. The majority of the small farms were operated by one family with seasonal labor performing a part or all of the cotton chopping and harvesting operations.

Medium-sized Cotton Farms. The medium-sized cotton farms averaged 219 acres with 179 acres of cropland, Table 3. The usual range in cropland was from 150 to 240 acres. However, a few farms were below this range and a few were considerably above. An average of 40 percent of the cropland was in cotton, 27 percent in grain sorghum and 22 percent in small grain, principally wheat. Of the remaining cropland, 8 percent was devoted to Sudan, corn and other feed crops, and 3 percent was idle. Milk cows, hogs and chickens were the principal livestock on the medium-sized farms. The majority of these farms were operated by one family with one or two workers available.

Large Cotton Farms. The cotton farms with 100 acres or more in cotton ranged from 120 to 2,010 acres, averaging 414 acres, Table 3. Cropland accounted for an average of 71 percent of the total land. Acreage in crops ranged from 100 to 1,020 acres, with a usual range from 180 to 400 acres. An average of 57 percent of cropland was in cotton, 18 percent in grain sorghum and 17 percent in small grain, principally wheat. The remaining 8 percent was devoted to Sudan, cane and other feed crops. None of the large farms reported workstock. Milk cows, other cattle, hogs and chickens were the principal livestock on the large cotton farms.

Table 3. Land, livestock and labor organization 1/

Organization	Size group 2/								
	Small			Medium			Large		
	Farms rptg.	Average	Usual range	Farms rptg.	Average	Usual range	Farms rptg.	Average	Usual range
	Pct.	Acres		Pct.	Acres		Pct.	Acres	
Land:									
Total:	100	215	110-230	100	219	150-240	100	414	200-500
Cropland	100	139	90-170	100	179	130-200	100	294	180-400
Other land	100	76	15-65	100	40	10-50	100	120	15-100
Cropland:									
Cotton	100	32	20-40	100	71	60-80	100	167	100-180
Corn	15	1	5-10	12	2	3-15	8	1	10-20
Grain sorghums	83	40	20-60	85	49	20-70	86	54	20-80
Forage sorghums	6	1	5-10	11	3	5-15	7	2	15-50
Wheat	66	41	20-60	56	34	10-50	44	43	30-125
Oats	32	13	5-40	17	5	5-20	16	6	10-40
Barley	6	1	10-20	-	-	-	2	-	-
Sudan	34	6	0-10	32	4	5-10	51	11	5-10
Other crops	21	5	10-30	25	5	5-20	30	10	5-25
Idle or fallow	-	-	-	7	6	-	-	-	-
	Farms rptg.	Average	Usual range	Farms rptg.	Average	Usual range	Farms rptg.	Average	Usual range
	Pct.	Number		Pct.	Number		Pct.	Number	
Livestock:									
Workstock	15	0.5	2-4	4	0.1	1-2	-	-	
Milk cows	96	3.8	2-3	88	2.7	2-3	94	2.7	2-3
Other cows	47	4.6	1-5	33	2.3	1-5	40	6.3	2-10
All other cattle	66	5.3	1-5	38	2.8	2-6	56	7.3	1-5
Brood sows	23	0.7	1-2	28	0.9	1-2	29	0.5	1-2
Other hogs	53	5.5	1-2	50	6.1	1-3	57	3.3	1-3
Hens and pullets	98	125.4	75-150	92	108.7	50-150	94	114.8	50-150
Sheep or goats	8	6.1	-	3	2.6	-	1	0.1	-
Saddle horses	-	-	-	1	0.1	-	4	0.2	-
	Farms rptg.	Average	Usual range	Farms rptg.	Average	Usual range	Farms rptg.	Average	Usual range
	Pct.	Number		Pct.	Number		Pct.	Number	
Labor:									
Operator:									
Families	100	1.00	1	100	1.00	1	100	1.02	1
Available workers	100	2.06	1-2	100	2.28	1-2	100	2.15	1-2
Cropper:									
Families	-	-	-	1	.01	1	4	.06	2
Available workers	-	-	-	1	.04	3	4	.18	4-6
Hired hand:									
Families	6	.06	1	4	.04	1	8	.11	1
Available workers	6	.17	3	4	.06	1	8	.29	2

1/ Usual range or usual number in table refers to those farms reporting.

2/ 47 small farms, 72 medium farms, 84 large farms.

Only 3 of the large farms had croppers, and only 7 reported a hired family on the farm. The majority of the farms were operated by one family which had one or two workers available.

On many farms in the Rolling Plains, cotton, wheat and grain sorghum are grown on the same farm. The relative proportion of each is somewhat dependent upon the soils. Therefore, some farms are primarily wheat or grain sorghum farms with some cotton, whereas on other farms cotton occupies the most important position and wheat or grain sorghum are minor crops.

On the average, the small farms have as much total land and almost as much cropland as the medium-sized farms. Furthermore, grain sorghum and wheat occupy more cropland than cotton. Most of the large and medium farms would be classed as cotton farms whereas many of the smaller farms are actually wheat or grain sorghum farms on which small acreages of cotton are grown. The proportion of land devoted to cotton was 23, 40 and 57 percent on small, medium and large farms, respectively.

Land Tenure

Approximately half of the land was operated under lease either on one-third and one-fourth basis or for cash rent, but principally the former. A more complete picture of the tenure situation may be obtained from Table 4.

Under the usual third and fourth tenure arrangements for cotton and grain sorghums, the tenant furnished all power and labor for the crops. Seed and poison were paid for by the tenant. Ginning expenses for cotton were divided, the landlord paying one-fourth and the tenant three-fourths. The tenant, in turn, received three-fourths of the cotton crop, while the landlord received one-fourth. The harvesting expenses for grain sorghum were divided, the landlord paying one-third and the tenant two-thirds. The tenant, in turn, received two-thirds of the grain sorghum crop, while the landlord received one-third.

Table 4. Proportion of land operated by owners and tenants and proportion of operators who were tenants or owners

Items	Size group			All farms
	Small	Medium	Large	
	Percent	Percent	Percent	Percent
Total land owned	49	43	48	47
Total land rented	51	57	52	53
Farm operators who were owners only	43	33	25	32
Farm operators who were tenants only	43	57	45	49
Farm operators who were combination tenant and owner	14	10	30	19

Farm Machinery

The farm machinery reported by size of farm is listed in Table 5. Pick-up trucks and larger trucks were not common on farms in any size group but tractors were found on practically all farms. Large farms had 1 or 2 tractors per farm. Common implements found on the majority of farms were breaking plows, section harrows, lister planters, cultivators, stalk cutters and trailers. Knives or go-devils were most common on the medium-sized farms. No mechanical cotton strippers were found on small farms while they were on 6 and 11 percent, respectively, of the medium and large farms.

Some indication as to the age of farm machinery may be obtained from Table 6 in which all tractors are grouped according to age. It may be noted that the newest tractors were reported on the small and large farms.

Table 5. Farm machinery reported per farm by size of farm

Item	Size group: Small			Medium			Large		
	Farms rptg.	Average age	Usual	Farms rptg.	Average age	Usual	Farms rptg.	Average age	Usual
	Pct.	Number		Pct.	Number		Pct.	Number	
Pick-up 1/4 to 3/4 ton	11	.1	-	10	.1	-	18	.2	-
Truck	8	.1	-	7	.1	-	13	.1	-
Tractors	94	1.1	1	100	1.2	1	100	1.6	1-2
Breaking plows	83	1.1	1	69	.9	1	86	1.2	1
Middle busters									
4-row	0	.0	-	0	.0	-	4	.0	-
3-row	6	.1	-	6	.1	-	8	.1	-
2-row	17	.2	-	19	.2	-	24	.3	-
1-row	2	.0	-	3	.1	-	0	.0	-
Disks									
Tandem	23	.2	-	11	.1	-	13	.1	-
Single	8	.1	-	0	-	-	2	.0	-
Section harrows	77	.8	1	58	.6	0-1	51	.6	0-1
Lister planters									
4-row	2	.0	-	4	.0	-	14	.2	-
2-row	92	1.1	1	97	1.1	1	83	1.2	1-2
Cultivators									
4-row	2	.0	-	3	.0	-	12	.1	-
2-row	92	1.1	1	99	1.1	1	94	1.4	1-2
Grain drills	45	.5	0-1	18	.2	-	34	.4	0-1
Mowers	13	.1	-	11	.1	-	13	.1	-
Hay balers	4	.0	-	1	.0	-	2	.0	-
Combines	26	.3	0-1	17	.2	-	32	.4	0-1
Cotton poison machines	4	.0	-	19	.2	-	19	.2	-
Stalk cutters	47	.5	0-1	71	.7	1	77	.9	1
Trailers	87	1.0	1	90	1.2	1	90	1.4	1-2
Knife or go-devils	38	.4	0-1	68	.7	1	60	.8	0-2
Grain binders	17	.2	-	6	.1	-	1	.0	-
Row binders	30	.3	0-1	22	.2	0-1	20	.2	0-1
Hoeme or chisels	6	.1	-	6	.1	-	8	.1	-
Machine cotton choppers	2	.0	-	6	.1	-	4	.0	-
Machine strippers	0	.0	-	6	.1	-	11	.1	-
Wagons	8	.1	-	1	.0	-	2	.0	-

Table 6. Tractor ages by size of cotton enterprise

Size group	Age in years								All tractors	
	1-3		4-6		7-9		10 and over			
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Small	12	23	9	17	11	21	21	40	53	100
Medium	14	16	18	21	21	24	33	38	86	100
Large	37	28	23	18	27	21	44	34	131	100
All farms	63	23	50	19	59	22	80	36	270	100

Custom work. Eighty-six percent of the farms studied reported hiring some custom work. Most of this work was combining and hauling grain sorghums and small grain. The more common charge for combining was $3.00 per acre, while hauling was 10 cents per 100 pounds.

A number of farms hired the row binding of forage sorghums. A few farms hired some seedbed preparation and some cultivating of crops on a custom basis. Only 14 percent of the farmers did any outside custom work with their own equipment. This was mainly combining.

Cotton Production Practices

Planting and Spacing Practices

A summary of planting practices by size of farm is shown in Tables 7 and 8. A large amount of replanting occurred in 1947, principally because of heavy rains during planting time.

The usual rate of seeding non-delinted cottonseed was about 16 pounds per acre. On farms planting delinted seed, the usual rate was 6 to 8 pounds per acre.

As most of the farmers planted a relatively small amount of seed per acre, less than 50 percent spaced or chopped their cotton, Table 8. Hand chopping was the principal method. Cross plowing was practiced on only 3 farms in the sample. The usual spacing was 8 inches for hand chopping. Row widths were generally either 38 or 40 inches.

Several varieties of seed are grown with no one variety predominant. Furthermore, many farmers used more than one variety. Most of the farmers planted seed that was 1 to 2 years from the breeder. As compared with home-grown seed, a larger proportion of the purchased seed was both treated and delinted. No significant difference in planting and spacing practices was found as between farms of different sizes. A slightly smaller percentage of the cotton was chopped by hand on medium and large farms.

Fertilizer, Poison and Defoliation Practices

Fertilizer. Commercial fertilizer is not used to any extent in the Rolling Plains area. This is probably because it lies within a sub-humid region where the average annual rainfall ranges from 20 to 28 inches.

Table 7. Planting seed, seed treatment and rate of seeding

Item		Size group			All farms
		Small	Medium	Large	
Cotton planted	(Acres)	1496	5133	14,035	20,664
Proportion of acres replanted	(Percent)	18	34	40	37
Proportion of farms using:					
Home-grown seed only	Do.	34	44	16	31
Purchased seed only	Do.	53	31	36	38
Both purchased and home-grown	Do.	13	25	48	31
Proportion of seed delinted:					
Home-grown	Do.	27	3	4	5
Purchased	Do.	18	22	11	14
All planting seed	Do.	23	10	7	8
Proportion of seed treated:					
Home-grown	Do.	33	11	34	28
Purchased	Do.	57	67	59	61
All planting seed	Do.	46	31	45	42
Rate of seeding delinted seed:					
Average amount per acre	(Pounds)	10	9	10	10
Usual amount per acre	Do.	7-8	6-8	7-11	6-8
Rate of seeding non-delinted seed:					
Average amount per acre	Do.	16	15	15	15
Usual amount per acre	Do.	16	16	16	16
Proportion of farms planting following varieties:					
Half and Half or Hi-Bred only	(Percent)	17	22	22	21
Mebane only	Do.	17	14	5	11
Western Prolific only	Do.	6	15	8	10
Northern Star only	Do.	13	8	7	9
Qualla only	Do.	13	4	8	8
Lockett "140" only	Do.	8	7	8	8
Other and mixed varieties	Do.	26	29	42	33
Proportion of farms planting seed:					
1 year from breeder		34	19	19	23
2 years from breeder		55	67	63	62
3 years from breeder		4	9	14	10
Over 3 years from breeder		7	4	3	4
Not known		-	1	1	1

Poison. Insect pests were not a serious problem in the area and very little poison was used. Poison was used on only 9 small farms on a total of 222 acres, 19 medium farms on a total of 971 acres and 9 large farms on a total of 1,163 acres. Thus, only 18 percent of the farms used poison on 11 percent of the total cotton acreage.

Flea hoppers, boll weevils, leaf worms and grasshoppers are the principal insects common to the area during years of infestation. Above-normal rainfall during the growing season usually increases the insect problem. On the farms studied, 83 percent reported poisoning 1 to 3 years out of the last 10 years, 15 percent 4 to 6 years out of the last 10 and only 2 percent reported poisoning as much as 7 out of the last 10 years.

Table 8. Method of planting and spacing cotton

Item		Size group			All farms
		Small	Medium	Large	
Cotton planted	(Acres)	1,496	5,133	14,035	20,664
Method of planting: 1/					
Solid in drill:					
Proportion of farms	(Percent)	91	94	96	95
Proportion of acreage	Do.	92	93	96	95
Hill dropped:					
Proportion of farms	Do.	9	8	4	6
Proportion of acreage	Do.	8	7	4	5
Method of spacing planted solid: 2/					
No spacing:					
Proportion of farms	Do.	53	69	68	65
Proportion of acreage	Do.	55	68	70	68
Hand chopped:					
Proportion of farms	Do.	43	31	30	33
Proportion of acreage	Do.	40	28	28	29
Machine chopped:					
Proportion of farms	Do.	2	4	2	3
Proportion of acreage	Do.	1	4	1	2
Cross plowed:					
Proportion of farms	Do.	4	-	1	1
Proportion of acreage	Do.	4	-	1	1
Row widths:					
Proportion of farms reporting:					
36-37 inch rows	Do.	17	1	1	5
38-39 inch rows	Do.	36	42	30	35
40 inch rows	Do.	38	49	55	49
Other row widths	Do.	9	8	14	11

1/ Some farms used a combination of solid in drill and hill dropped.

2/ Some farms used a combination of hand chopped and machine chopped.

Defoliation. One medium-sized farm and 2 large farms attempted defoliation on a total of 110 acres. Calcium cyanimid was applied by airplane at the rate of 15 pounds per acre. Date of application was the first part of October. Results varied from not very effective to excellent.

Labor Hired and Wages Paid for Specific Operations

Labor. A large proportion of the cotton chopping and practically all of the cotton snapping in 1947 was done by workers not living on the farm, Table 9. Most of the other farm work was done by the operator and his family.

Wages. The usual wage rates for specific operations are shown in Table 10. Wage rates varied widely for different operations. Those shown are the more common. Rates for snapping varied from $1.50 to $3.00 per hundred pounds of seed cotton, depending on yield, competition for labor and time of year. Rates for labor hired by the day varied from $4.00 to $6.00 depending on the competition for labor and type of work.

Table 9. Proportion of hired labor performed by non-farm residents

Percent of operations	Size group			All sizes
	Small	Medium	Large	
	Percent of farms	Percent of farms	Percent of farms	Percent of farms
Cotton chopping:				
0-25 percent	53.2	36.1	14.3	31.0
26-50 percent	6.4	12.5	10.7	10.4
51-75 percent	4.2	11.1	14.3	10.8
76-100 percent	36.2	40.3	60.7	47.8
Cotton snapping:				
0-25 percent	25.5	5.5	1.2	8.4
26-50 percent	6.4	5.6	2.4	4.4
51-75 percent	2.1	12.5	2.4	5.9
76-100 percent	66.0	76.4	94.0	81.3
Regular farm work:				
0-25 percent	95.7	93.0	88.1	91.6
26-50 percent	0.0	4.2	7.1	4.4
51-75 percent	0.0	1.4	3.6	2.0
76-100 percent	4.3	1.4	1.2	2.0

Table 10. Usual wage rates for specific operations

Item	Dollars
Cotton chopping:	
Per day	5.00
Per hour	0.50-0.60
Cotton snapping per 100 pounds of seed cotton	2.00-2.25
Regular farm work:	
Per day	5.00
Tractor drivers:	
Per day	5.00-6.00

Average Yield, Method of Harvest and Gin Turn-out

The average yield of lint cotton per acre, the method of harvest and the gin turn-out of lint and seed are listed in Table 11.

The average cotton yield of 165 pounds of lint per acre on farms studied was 10 pounds higher than the 1937-46 average yield in the Rolling Plains area. Ninety-seven percent of the bales harvested were hand-snapped, while only 3 percent were machine stripped. None of the cotton was picked. Normally, all of the cotton is hand-snapped unless snapping wages are unusually high and an early frost occurs.

The gin load or quantity of seed cotton and trash required per 500-pound gross weight bale of lint varied only slightly between size groups of farms, Table 11. On the average, a bale of snapped cotton yielded 25 percent lint, 41 percent seed and 34 percent trash. The average turn-out for machine-stripped cotton was 23 percent lint, 37 percent seed and 40 percent trash. It is doubtful if this is a fair comparison because the machine-stripped sample was small and machine stripping was primarily a scrapping operation after the cotton had been snapped by hand previously.

Table 11. Cotton harvesting practices

Item		Size group			All farms
		Small	Medium	Large	
Acre yield of lint	(Pounds)	170	185	157	165
Proportion of cotton:					
Hand-snapped	(Percent)	99	96	97	97
Machine-stripped	Do.	1	4	3	3
Seed cotton and trash per bale: 1/					
Hand-snapped	(Pounds)	1,835	1,885	1,910	1,885
Machine-stripped	Do.	2,250	2,200	2,005	2,110
Cottonseed per bale:					
Hand-snapped	Do.	775	785	785	780
Machine-stripped	Do.	750	770	790	780
Percent turn-out:					
Hand-snapped					
Lint	(Percent)	26	25	25	25
Seed	Do.	42	42	41	41
Machine-stripped					
Lint	Do.	21	22	24	23
Seed	Do.	33	35	39	37

1/ Figured on 500-pound gross weight bale of lint.

Labor and Power Requirements

Cotton

The number of farms using different types of power is shown in Table 12. Two-row tractor equipment was used on 90 percent of the farms. Only 4 farms used horse equipment. Labor and power used in the performance of the usual operations in the production of cotton are listed in Table 13.

Table 12. Number of farms using different types of power

Type of power and equipment	Size group			All farms
	Small	Medium	Large	
	Number	Number	Number	Number
4-row tractor	1	-	6	7
2-row tractor	41	69	72	182
2- and 4-row tractor	-	3	6	9
Horse and tractor	1	-	-	1
Horse	4	-	-	4
Total	47	72	84	203

Table 13. Labor and power required per acre for the usual operations in producing cotton

Usual operations	Times over	4-row tractor-drawn equipment		2-row tractor-drawn equipment	
		Hours per acre		Hours per acre	
		Man	Tractor	Man	Tractor
Seedbed preparation					
Flatbreak or oneway	0.50	0.50	0.50	0.50	0.50
List or bed	2.00	0.66	0.66	0.69	0.69
Cultivate beds	1.00	0.25	0.25	0.44	0.44
Plant	1.40	0.41	0.41	0.67	0.67
Cultivate	4.00	1.04	1.04	1.92	1.92
Chop and hoe	1.60	5.00	-	5.00	-
Total pre-harvest		7.86	2.86	9.49	4.49
Harvest					
Snapping	2.00	17.37	-	17.37	-
Hauling	-	1.20	1.20 1/	1.20	1.20 1/
Total harvest		18.57	1.20	18.57	1.20
Cut stalks	0.50	0.10	0.10	0.18	0.18
Total all operations		26.53	4.16	28.24	5.87

1/ Car and trailer.

Seedbed Preparation. The methods used and the amount of seedbed preparation varied considerably depending on such things as preceding crop, type of soil and rainfall. A flatbreaking, onewaying or disking operation was performed on about half of the farms. The usual implements used were a 5 or 6-foot oneway, a 2-bottom moldboard plow, or a 3-disk plow. Only a few of the farmers harrowed the land. A chisel or Hoeme was used on a small number of farms.

Ninety-eight percent of the farmers either bedded or listed their land, usually twice. The majority cultivated the beds once either with a cultivator or knife. Two-row tractor farms used a 2-row lister or 2-row cultivator or knife for the above operations. The majority of the 4-row tractor farms used a 3-row lister for the listing and a 4-row cultivator or a 3-row knife for cultivating the beds.

Planting. Cotton planting on the majority of farms was done during the month of May or the first two weeks in June. An average of about 40 percent of the acreage was replanted, principally because of heavy rains immediately after planting.

Cultivation. The number of cultivations following planting varied from 1 to 6 times between individual farms depending on planting date and weed growth. The usual number was 4 times. A few of the farmers used a harrow for the first cultivation. The majority used a knife or go-devil for the first cultivation and a cultivator for the others.

Hoe Labor. As shown in Table 8, only 32 percent of the cotton acreage was chopped or thinned. However, the cotton was cultivated with hand hoe labor slightly over 1.5 times, principally to eliminate grass and weed growth, Table 13. Cross plowing was practiced on only 2 farms, while 4 farmers relied on machine choppers for the thinning operation.

Harvesting. As mentioned earlier, 97 percent of the bales harvested were hand snapped, and only 3 percent were machine stripped. Machine strippers were used on only 16 of the farms studied, principally as a scrapping operation. It is not practicable at present to machine strip cotton before frost has killed the leaves and cracked open the green bolls. The development of an effective defoliant probably would change present harvesting practices.

Although harvest normally begins around September 1, it did not begin until the middle of September or later on the majority of farms in 1947. Most of the cotton was out by the first week in December, but some was gathered after Christmas.

The usual harvesting requirements shown in Table 13 are based on an average yield of 165 pounds of lint cotton per acre. An average of 380 pounds of snapped seed cotton was gathered by each laborer in a 10-hour day. Cotton was hauled to the gin by car and trailer on over 60 percent of the farms.

Harvesting labor requirements were slightly above normal because the 1947 yield was 13 pounds higher than the 1937-46 average for the area.

Cut Stalks. Cotton stalks were cut on about 50 percent of the cotton acreage. A two-row stalk cutter was used on the 2-row tractor farms, while a 4-row was used on the 4-row tractor farms. As the area lies within a sub-humid region, cotton stalks do not grow very large. For this reason, many farmers do not cut stalks but use either a oneway, breaking plow, or lister to turn the stalks previous to the next crop.

Total Labor and Power Requirements. The usual operations in producing cotton on farms using 4-row tractor equipment required 26.5 hours of man labor and 4.2 hours of tractor work. On farms using 2-row tractor equipment the totals were 28.2 hours of man labor and 5.9 hours of tractor work.

Tractor hours included 1.2 hours for car and trailer with each size of equipment. The totals are slightly above normal because of the above normal cotton yield.

A comparison of total requirements in Table 13 shows a saving of only 1.7 hours of man labor and tractor work per acre when 4-row tractor equipment was used instead of 2-row tractor equipment. If 4-row tractor farms had used a 4-row lister and 4-row knife rather than 3-row implements the difference would have been larger. The main advantage of using 4-row tractor-drawn equipment lies in the performance of the critical operations of planting and cultivating. One man can farm a much larger acreage of cotton when using 4-row tractor equipment rather than 2-row equipment. This area has been slow to change from 2-row tractor equipment to 4-row equipment. Many sections of the Rolling Plains are limited to the use of 2-row equipment because of size and shape of field, rolling topography of land, sharp turns on contours and the presence of terraces on the fields.

Variations from Usual Requirements. Rates of performance, power and labor required, proportion of farms using and proportion of cotton acreage covered with different implements are listed in Table 14. Data shown in this table indicate the variations from the usual operations and rate of performance for the various implements used.

Combine Grain Sorghum

Combine-type sorghums were an important cash crop on the majority of cotton farms. Sorghums harvested for grain accounted for 29 percent of the cropland on small farms, 27 percent on medium-sized farms and 18 percent on large farms.

The range in yield per acre on 33 farms was from 250 pounds to 1,500 pounds. The average yield was 900 pounds, while the 5-year average yield was reported to be 1,100 pounds. Seventy-five percent or more of the harvested crop was sold on the majority of farms studied.

The majority of the farmers planted Martin's or Plainsman's combine maize. The rate of planting varied from 3 to 8 pounds per acre, the average was 6 pounds. Planting dates varied from the latter part of March to the first part of June. Ninety-two percent of the farms used treated seed.

The amounts of labor and power required per acre for the usual operations performed in producing grain sorghums are listed in Table 15. Two-row tractor equipment was used on all farms on which records were obtained.

In seedbed preparation, a few farmers used a disk harrow or chisel, but flat-breaking or onewaying was most common. All of the land was listed at least once, and many farmers listed twice. About one-third of the land was cultivated with a knife or go-devil, while all farms used a cultivator after planting. Thirty-five percent of the farms did some hand hoeing for grass and weeds. As this was not a common practice, it was not included with usual operations. A 2-row combine was the common equipment used to harvest combine sorghums. A truck or car and trailer was used to haul the grain.

Table 14. Rates of performance, power and labor required, proportion of farms using and proportion of cotton acreage covered with different implements

Item	Proportion of farms reporting 1/	Proportion of cotton acreage covered	Times over	Number machines in sample	Acres covered per 10 hr. day	Hours per acre once over	
						Man	Tractor
	Percent	Percent	No.	No.	Acres	Hours	
Cut stalks	53	48	1.0				
Tractor equipment	51	47					
4-row cutter	8	8	1.0	28	50.0	0.20	0.20
3-row cutter	14	12	1.0	42	37.0	0.27	0.27
2-row cutter	27	25	1.0	63	28.0	0.36	0.36
Other sizes	2	2	1.0	5	-	-	-
Horse equipment	2	1	1.0	3	-	-	-
Flat break or oneway	52	34	1.1				
Tractor equipment	51	34	1.1				
6 foot oneway	10	6	1.2	20	18.0	0.56	0.56
5 foot oneway	5	5	1.2	13	14.0	0.71	0.71
4 foot oneway	4	3	1.4	8	13.0	0.77	0.77
3 foot oneway	3	2	1.1	6	11.0	0.91	0.91
Other oneways	3	3	1.3	6	-	-	-
3 disk plow	6	3	1.1	13	7.0	1.43	1.43
Other disk plows	4	1	1.1	9	-	-	-
3-bottom moldboard	1	1	1.0	3	9.0	1.11	1.11
2-bottom moldboard	10	7	1.0	22	7.0	1.43	1.43
1-bottom moldboard	5	3	1.0	11	4.0	2.50	2.50
Horse equipment	1	- 2/	1.0	2		-	-
Disking-tractor	5	4	1.1	-			
5 to 7 foot tandem	5	4	1.1	10	22.0	0.45	0.45
Hoeme or chisel-tractor	8	6	1.4				
8 - 9 foot Hoeme or chisel	4	4	1.0	8	2.40	0.42	0.42
6 foot Hoeme or chisel	1	1	1.2	3	17.0	0.59	0.59
Other Hoeme or chisels	3	1	1.5	6	-	-	-
Harrow - tractor	12	6	1.1				
4-section harrow	2	1	1.3	3	63.0	0.16	0.16
3-section harrow	6	4	1.0	13	50.0	0.20	0.20
2-section harrow	4	1	1.1	8	32.0	0.31	0.31
Sweep land - tractor	5	5	1.5				
8 - 9 foot Hoeme or chisel	1	1	1.0	3	30.0	0.33	0.33
2-row cultivator	1	2	1.9	4	20.0	0.50	0.50
Other implements	2	1	1.3	4	-	-	-

Table 14. Rates of performance, power and labor required, proportion of farms using and proportion of cotton acreage covered with different implements - continued -

Item	Proportion of farms reporting 1/	Proportion of cotton acreage covered	Times over	Number machines in sample	Acres covered per 10 hr. day	Hours per acre once over	
						Man	Tractor
	Percent	Percent	No.	No.	Acres	Hours	
List or bed	98	97	1.7				
Tractor equipment	96	96	1.7				
4-row lister	4	6	2.1	8	34.0	0.29	0.29
3-row lister	14	17	1.3	32	30.0	0.33	0.33
2-row lister	76	71	1.7	160	21.0	0.48	0.48
1-row lister	2	2	1.2	5	10.0	1.00	1.00
Horse equipment	2	1	1.0	4	-	-	-
Cultivate beds-tractor	58	56	1.2				
3-row knife	9	10	1.3	19	35.0	0.29	0.29
2-row knife	21	21	1.0	47	22.0	0.45	0.45
Other knives	2	4	1.0	4	-	-	-
2-row cultivator	24	19	1.4	49	23.0	0.43	0.43
Other cultivators	2	2	1.3	4	-	-	-
Chop or cut beds -tractor	20	22	1.5				
Stalk cutters	20	22	1.5				
Lay off rows - tractor	4	2	1.0				
2-row cultivator	4	2	1.0	9	25.0	0.40	0.40
Planting	100	100	1.4				
Tractor equipment	98	99					
4-row planter	8	13	1.3	17	35.0	0.29	0.29
2-row planter	92	86	1.4	212	21.0	0.48	0.48
Horse equipment	2	1	1.0	4	-	-	-
Harrow - tractor	9	5	1.1				
Section harrows	9	5	1.1	-	-	-	-
Knife	56	56	1.2				
Tractor equipment	55	56	1.2				
4-row knife	1	4	1.0	8	40.0	0.25	0.25
3-row knife	1	2	1.0				
2-row knife	53	50	1.2	107	21.0	0.48	0.48
Horse equipment	1	- 2/	1.0	2			
Cultivating	100	100					
Tractor equipment	98	99	3.3				
4-row cultivator	6	8	4.0	12	39.0	0.26	0.26
2-row cultivator	94	91	3.2	219	21.0	0.48	0.48
Horse equipment	2	1	3.6	4	-	-	-

Table 14. Rates of performance, power and labor required, proportion of farms using and proportion of cotton acreage covered with different implements - continued -

Item	Proportion of farms reporting 1/	Proportion of cotton acreage covered	Times over	Number machines in sample	Acres covered per 10 hr. day	Hours per acre once over	
						Man	Tractor
	Percent	Percent	No.	No.	Acres	Hours	
Cut or Chop beds -tractor	12	10	1.2				
Stalk cutters	12	10	1.2				
Cross plow - tractor	1	- 2/	1.0				
2-row cultivator	1	-	1.0	2	20.0	0.50	0.50
Chop and hoe - hand	99	98	1.6	-	3.2	3.12	-
Machine chop	2	2					
2-row chopper	2	2	1.0	5	30.0	0.33	0.33
Poison	15	11	1.3	-			
Tractor equipment	13	11		-			
8-row duster	8	8	1.2	16	125.0	0.08	0.08
6-row duster	2	1	1.0	4	95.0	0.14	0.14
Other dusters	3	2	2.5	7	-	-	-
Hand duster	2	- 2/	6.9	4	9.0	1.10	-
Defoliate - tractor	1	- 2/	1.0				
8-row duster	1		1.0	2	125.0	0.10	0.10
Snapping - hand	100	97	2.0		380 3/		
Machine stripping	8	11	1.0				
2-row stripper	8	11	1.0	16	16.0	1.26	0.63
Sledding	1	1	1.0				
2-row sled	1	1	1.0	2	18.0	1.12	0.56
Hauling	100	-	-	-	-	-	-
Truck	27						
Trailer	64						
Truck and trailer	8						
Wagon	1						

1/ Some farms reported use of more than one size of a particular implement for the same operation, such as in planting - some farmers used both 2-row and 4-row planters.

2/ Percent of acreage not listed if less than 0.5 percent.

3/ Pounds of seed cotton per man.

Table 15. Labor and power required per acre for the usual operations in producing combine sorghums

Usual operations	2-row tractor-drawn equipment		
	Times over	Hours per acre	
		Man	Tractor
Seedbed preparation:			
Flatbreak or oneway	50	0.40	0.40
List or bed	2.00	0.96	0.96
Cultivate beds	1.00	0.44	0.44
Plant	1.10	0.53	0.53
Cultivate	3.00	1.44	1.44
Total previous to harvest		3.77	3.77
Harvest:			
Combine	1.00	0.53	0.53
Haul	1.00	0.53	0.53 1/
Total harvest		1.06	1.06
Cut stalks	.50	0.18	0.18
Total all operations		5.01	5.01

1/ Truck or car and trailer.

The usual operations in producing combine sorghums on farms using 2-row tractor equipment required a total of 5 hours of man labor and tractor work. Hauling by car and trailer or by truck was included with tractor work.

Wheat

Small grain, principally wheat, was an important cash crop on the majority of cotton farms. Wheat accounted for 29 percent of the cropland on small farms, 19 percent on medium-sized farms and 15 percent on large cotton farms.

The range in yield per acre on 37 farms was from 5 to 28 bushels. The average yield was 15 bushels per acre, while the most recent 5-year average yield was reported to be 12 bushels. Eighty-five percent or more of the harvested crop was sold on all farms.

The Blackhull variety of wheat was planted on 68 percent of the farms. The usual rate of seeding wheat was from 40 to 60 pounds per acre. Seeding was done from the latter part of September to the first part of December. Fifty-one percent of the farms used treated seed.

The amounts of labor and power required per acre for the usual operations performed in producing wheat are listed in Table 16. It should be noted that the operations performed and the power and equipment used are only for the small-scale wheat production on cotton farms in the area. Production requirements for large-scale wheat farming would be different.

Table 16. Labor and power required for the usual operations in small grains

Usual operations	Tractor-drawn equipment		
	Times over	Hours per acre	
		Man	Tractor
Seedbed preparation			
Oneway	2.00	1.00	1.00
Subsoil, chisel or sweep	0.50	0.22	0.22
Harrow or disk	0.50	0.20	0.20
Plant or drill	1.00	0.26	0.26
Total previous to harvest		1.68	1.68
Harvest			
Combine	1.00	0.53	0.53
Haul	1.00	0.53	0.53 1/
Total harvest		1.06	0.53
Total all operations		2.74	2.74

1/ Truck.

In seedbed preparation, 3 farms used a lister rather than a oneway; a 6-foot oneway was the most common size of oneway used. About one-third of the land was disked with a tandem disk, while 50 percent of it was covered with a Hoeme equipped with chisels or sweeps. Thirty percent of the land was harrowed.

The common sizes of drills used on wheat farms for the planting operation were 10 to 12 feet in width. The most common sized combine used had a 6-foot cut. The majority of farmers hired a truck to haul the grain to market. A total of 2.7 hours of man labor and tractor work, including hauling by truck, were required per acre for the usual operations in producing wheat. Harvesting extended from the middle of May to the first part of July.

Possibilities for Further Changes in Production Practices

Although the acreage of cotton in the Rolling Plains area decreased from a total of 3,381,000 acres in 1929 to 1,622,700 acres in 1947, cotton is still an important cash crop. Acreage in 1948 was slightly larger than 1947. Acreage in 1949 is even larger than in 1948, principally because of the price prospects of cotton and the slump in grain prices in 1948.

Cotton fits well into the farming and rotation system. From the standpoint of labor and power requirements, it is at a disadvantage, however, because the competing crops of small grains and grain sorghums are completely mechanized. In 1947, only slightly more than 5 hours of labor were expended per acre for the usual operations in producing grain sorghums with 2-row tractor equipment. The usual operations for the production of wheat required less than 3 hours of labor per acre. For cotton, the total labor requirements were slightly over 28 hours per acre with 2-row tractor equipment.

Two operations, hoeing and harvesting, made up 83 percent of the total labor requirements for cotton. Hoeing was not a common practice on combine sorghums and none was required for wheat. Harvesting operations made up 21 percent of the total labor requirements for combine sorghums and 39 percent of the total requirements for wheat.

The total of over 5 hours of hand hoe labor required may be greatly reduced or eliminated in the future. As cotton was planted to a stand, the thinning operation was not required on 65 percent of the farms. The remainder of the farms may eliminate the chopping operation in the same manner or reduce it by cross plowing or machine chopping. The hand hoeing of weeds and grass may be reduced or eliminated through the use of rotary hoes, flame cultivators and chemicals. Flame cultivation and chemical weed control are still in the experimental stage in other areas.

Relatively efficient 2-row mechanical cotton strippers are now in commercial production. Although impracticable to use before frost, these machines do a good job of harvesting after the leaves have been defoliated and the green bolls cracked open by frost. As open cotton deteriorates and suffers reduction in grade when left standing in the field, the machine stripper has not been used to any great extent in the area.

The development of an effective defoliant offers the greatest opportunity for reducing labor requirements for cotton in this area. Although still in the experimental stage, late tests with certain chemicals show promise.

To properly visualize future cotton practices, it is necessary to make certain assumptions. If a successful defoliant is developed making it practicable to strip cotton before frost, 2-row machine strippers may then be used which will harvest 2 acres per hour. Three men are required to harvest and haul the cotton. The harvesting labor requirements would be 1.5 hours per acre as compared with between 18 and 19 hours in 1947. Planting cotton to a stand will eliminate the thinning operations. Although not in general use in this area, rotary hoes have reduced hand hoeing in some sections of the cotton belt. Flame cultivators have also been used successfully when mounted on the tractor and used simultaneously with regular cultivators. Assuming that cotton is planted to a stand, that one additional cultivation is needed with rotary hoe attachments, and that flaming is practiced along with regular cultivations, the labor requirements previous to harvest could be reduced from 9.5 hours per acre in 1947 to 5 hours.

Under these assumptions of complete mechanization of the cotton crop on 2-row tractor farms, total labor requirements per acre of cotton would be less than 7 hours as compared with 28 hours required for cotton and 5 hours required for combine sorghum in 1947. Such a labor requirement for cotton would greatly improve its competitive position.

Assuming that the cotton crop can be fully mechanized, the individual cotton grower will then be faced with the decision as to how much machinery can economically be substituted for labor. Under complete mechanization, the problem of obtaining seasonal labor would be eliminated.

Although these assumptions include practices which are far from realization, it is not too early for farmers and farm leaders to think about the possibilities for change in cotton production practices and to make plans to meet these changes.

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